

REMARKS

1) Claims 1 and 3 have been amended as shown above. Claims 5-8 and 10-20 are cancelled.

Claim 1 has been clarified to state that the catalytic metal particles consist essentially of an alloy of two precious metals selected from platinum, palladium, and rhodium. These materials are disclosed at page 7, lines 14-16, as well as the originally filed claim 7. It is known in the art that these precious metals are within the group defined as transition metals, as disclosed throughout the specification. Furthermore, Example 2 shows the use of a platinum/palladium alloy, while Example 3 shows the use of a platinum/ruthenium alloy. Claim 1 has further been clarified to state that the porous carrier consists essentially of ceria-zirconia. This amendment is supported by the originally filed specification at page 4, lines 16-17 as well as the originally filed claim 1, which both state that the porous carrier includes an oxide containing a rare earth oxide. In addition, page 9, line 25 discloses a porous carrier made of a ceria-containing organic oxide. Specific support for a ceria-zirconia carrier is shown on page 7, line 22, as well as the originally filed claim 8.

Claim 1 is further amended to now require that the ceria-zirconia has a ceria content of from 15 wt% to 48.2 wt%. It is submitted that the lower limit of 15 wt% is disclosed in the originally filed specification at page 7, line 27. It is submitted that Example 1 discloses an upper limit of ceria content in the ceria-zirconia as being 40 mol.%. Applicants hereby submit that the 40 mol%, converted into terms of wt% of the overall ceria-zirconia catalyst, is equivalent to 48.2 wt%. The present specification has been clarified as shown above to state that the disclosed 40 mol.% is equivalent to 48.2 wt% of the catalyst. Thus, is urged that the above amendment to the claims and specification is merely a clarification, and does not present any new matter.

Claim 1 has further been amended to include the limitation of claim 6, now amended. This limitation requires that the porous carrier has a specific surface area of 10 to 250 m²/g for 1 wt% of an amount of catalytic metal supported relative to the whole catalyst. Support for this amendment can be found at page 8, lines 3-5 and in the originally filed claim 6.

Claim 1 is further limited to require that the precious metals form single particles. Support for such single particles can be found in the originally filed specification at page 2, line 4, as well as the last lines of Examples 2 and 3. Claim 1 has further been limited to a catalyst for purifying an automotive exhaust gas. Applicants submit that this limitation distinguishes the field of present invention from the field of the cited art. Page 1, lines 11-23 discuss the uses of catalyst for cleaning automobile emissions. Page 10, lines 10-20 deal with gasoline engines, diesel engines, and lean burn engines.

Claim 3 has been amended to provide a complex oxide which comprises a precious metal as the transition metal, and a ceria as the rare earth metal oxide. Support for these materials can be found throughout the specification, such as on page 6, line 6; and on page 7, lines 14-16 and 19-22.

2) The Examiner has rejected claims 1, 5, and 7-8 under 35 U.S.C. 103 over Herron in view of Kolaczowski. Applicants respectfully urge that this ground of rejection has been overcome by the instant amendment. It should be further noted that claims 5 and 7-8 are cancelled by the above amendment.

The present invention relates to catalysts for cleaning or purifying emissions from gas and diesel engines of automobiles and the like. In particular, the invention relates to catalyst capable of maintaining high activity for a long period even in a high-temperature atmosphere. The presently amended claim 1 provides a catalyst for purifying an automotive exhaust gas comprising catalytic metal particles supported on a porous carrier, wherein the catalytic metal particles consist essentially of an alloy of two precious metals selected from platinum, palladium, and rhodium, wherein the porous

carrier consists essentially of ceria-zirconia having a ceria content of from 15 wt% to 48.2 wt%, wherein the porous carrier has a specific surface area of 10 to 250 m²/g for 1 wt% of an amount of catalytic metal supported relative to the whole catalyst, wherein the catalytic metal particles have from 10 to 50000 atoms, and wherein the precious metals form single particles.

Herron relates to a process for producing hydrocarbons using a particular catalyst. However, Herron teaches a catalyst which greatly differs from that of the presently claimed invention. Herron relates specifically to a *cobalt* particles as their catalytic metal. This is a major difference between Herron and the present invention, which does not mention cobalt anywhere in the disclosure. Rather, the present claims require that the catalytic metal particles consist essentially of an alloy of two precious metals selected from platinum, palladium, and rhodium. Nowhere does Herron teach or suggest catalyst metal particles formed of such a two-component alloy. Importantly, Herron also fails to disclose a carrier consisting essentially of ceria-zirconia, as presently required. The only mention of a ceria carrier in Herron is a carrier which contains *only* cerium oxide (ceria). Herron does not teach or suggest the presence of zirconia in their ceria carrier. In contrast, the present invention requires a mixed oxide carrier consisting essentially of ceria and zirconia, wherein the ceria content is from 15 wt.% to 48.2 wt.%. This is clearly below the 100% ceria content of the only ceria carrier embodiment mentioned by Herron.

In addition, it is urged that the catalysts of Herron relate to a non-analogous field of art as compared to the present catalysts. The present invention relates to the combustion and decomposition of an automotive exhaust gas, and the present catalysts are completely different from the compound-synthesized catalysts as seen in Herron. Applicants therefore urge that one skilled in the art would not have been inspired to formulate the presently claimed invention upon a reading of Herron.

The Examiner previously asserted that the only difference between the present invention and Herron was that Herron did not specifically teach the quantity of catalytic metal

particles required by the claims. That is, the present claims required that the catalytic metal particles have from 10 to 50000 atoms. Thus, the Examiner cited Kolaczowski in an attempt to fill the voids of Herron. Applicants first submit that this ground of rejection is now moot, since the presently amended claims require that the catalytic metal particles consist essentially of an *alloy* of two precious metals *selected from platinum, palladium, and rhodium*. Since these materials are not taught by either Herron or Kolaczowski, Applicants urge that it is moot whether or not Kolaczowski teaches particles having from 10 to 50000 atoms. Furthermore, it is urged Kolaczowski does not even disclose such a particle range at all. Rather, the Examiner points to the thickness and diameter of Kolaczowski's catalyst layer. It is urged that the Examiner has not provided any technical reasoning upon which he based his conclusion that a catalyst layer of the size and shape of Kolaczowski would include particles having from 10 to 50000 atoms per se. Applicants further urge that even if these particle amounts were hypothetically taught by Kolaczowski, the present claims would still fail to be obviated since neither cited reference teaches the specific catalyst metal particles or the carrier material required by the presently amended claims.

For all of the above reasons, is respectfully urged that one skilled in the art having common sense at the time of the invention would not have reasonably considered combining the teachings of Herron and Kolaczowski in the manner suggested by the Examiner. It is therefore respectfully submitted that the 35 U.S.C. 103 rejection has been overcome by the instant amendment.

3) The Examiner has rejected claims 2-3, 6, 10-11, 14-15, 17, and 19-20 under 35 U.S.C. 103 over Herron in view of Kolaczowski and in further view of Shibamura. It should be noted that claims 6, 10-11, 14-15, 17, and 19-20 are cancelled by the above amendment. Further, it is respectfully urged that the rejections of claims 2-3 are now overcome by the instant amendment.

The Examiner agrees that neither Herron nor Kolaczowski teach catalyst particles which are present in an oxidizing atmosphere, as required by claims 2 and 3. The Examiner

thus cites Shibamura for teaching a catalyst which may be activated with an oxygen containing gas. However, it is respectfully urged that whether or not this feature is taught by Shibamura is now moot, in view of the instant amendment.

The arguments against Herron and Kolaczowski are repeated from above and apply equally here. That is, both Herron and Kolaczowski fail to disclose the presently required catalytic metal particles, which consist essentially of an alloy of two precious metals selected from platinum, palladium, and rhodium. Neither cited reference discloses a carrier consisting essentially of ceria-zirconia, as presently required. The only mention of a ceria carrier in Herron's disclosure is a carrier which contains *only* cerium oxide (ceria). This differs from the present claims which require a mixed oxide carrier consisting essentially of ceria and zirconia, wherein the ceria content is from 15 wt.% to 48.2 wt.%. Herron also exists in a non-analogous field of art as compared to Kolaczowski, and as compared to the present invention. Thus, claim 1 as presently amended is sufficiently inventive in view of these references, as stated above.

Applicants urge that whether or not some of the individual additional features of claims 2 or 3 may be otherwise known in the art is moot, these claims relate to *narrower* embodiments of the invention disclosed in claim 1. Thus, since the presently amended claim 1 is non-obvious in view of the cited art for the reasons argued above, it is urged that all claims depending from claim 1 should be considered non-obvious as well. Applicants therefore respectfully submit that this ground of rejection has been overcome by the instant amendment.

4) The Examiner has rejected claims 4, 9, 12-13, 16, and 18 under 35 U.S.C. 103 over Herron in view of Kolaczowski and Shibamura and in further view of Gupta. It should be noted that claims 12-13, 16 and 18 are cancelled by the above amendment. The remaining claims 4 and 9 provide embodiments of the present invention which relate to a product formed by reducing the catalyst of previous claims. Claims 4 and 9 require that the catalyst comprises granular catalytic particles having a particle size of 1 to 10 nm, supported on a porous carrier. The Examiner takes the position that it would have

been obvious for one skilled in the art to combine the above references to formulate the inventions of claims 4 and 9. Applicants respectfully disagree, and urge that this rejection has been overcome by the instant amendment.

The arguments against Herron, Kolaczowski, and Shibanuma are again repeated from above and apply equally here. Regarding Gupta, the Examiner cites this reference for teaching a catalyst comprising spherical particles ranging in size from 6 nm to 60 nm. However, whether or not the catalyst particle sizes of claims 4 and 9 are taught by Gupta, these claims all relate to *narrower* embodiments of the invention disclosed in the presently amended claim 1. Applicants have shown above that the cited references Herron, Kolaczowski, and Shibanuma fail to obviate the present claims since *none* of the cited references teach or suggest catalytic metal particles which consist essentially of an alloy of two precious metals selected from platinum, palladium, and rhodium. Likewise, none of the cited references provide a ceria-zirconia carrier having a ceria content is from 15 wt.% to 48.2 wt.%. Thus, since claim 1 is sufficiently non-obvious in view of the cited art, it is urged that all of those claims depending therefrom should be considered non-inventive as well. For all of the above reasons, it is respectfully submitted that the 35 U.S.C. 103 rejections have been overcome by the instant amendment and should be withdrawn.

The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the Examiner believes there is any matter which prevents allowance of the present application, it is requested that the

undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,



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I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office (FAX No. 571-273-8300) on November 18, 2008.



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